CLAIMS

What is claimed is:

1. A high-throughput screening method, comprising the steps of:

(A) sequentially loading a plurality of discrete combinations of reactants into a longitudinal reaction zone;

(B) reacting each of said plurality of combinations as each combinations passes through said reaction zone to provide a continuously or an incrementally varying reaction product; and

(C) sequentially discharging the reaction product of each of said combinations from said reaction zone as reaction of each of said combinations is completed.

2. The method of claim 1, wherein the discrete combinations of reactants vary in identity or amount.

3. The method of claim 1, wherein step (B) comprises subjecting each sequentially loaded combination to a varying reaction parameter within said zone.

4. The method of claim 1, wherein each combination of reactants is loaded in a vial prior to step (A).

5. The method of claim 1, wherein said combinations of reactants are suspended in a vapor stream.

6. The method of claim 2, further comprising the steps of:

(D) detecting said varying products and

(E) correlating said products with said varying reactants to provide a nonrandom combinatorial library of product.

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7. The method of claim 3, further comprising the steps of:

(D) detecting said varying products and

(E) correlating said products with said varying reaction parameters to provide a nonrandom combinatorial library of product.

8 The method of claim 1, further comprising sequentially loading said combinations into an air lock, sealing said air lock and pressurizing said air lock to a pressure substantially equal to a pressure in said reaction zone prior to loading said combinations according to step (A).

9. The method of claim 1, further comprising sealing an air lock prior to discharge of said reaction product according to said step (C); discharging said reaction product from said reaction zone to said air lock; sealing said air lock from said reaction zone; releasing pressure in said air lock; and discharging said reaction product from said air lock.

10. The method of claim 1, wherein said combinations of reactants are at least partially embodied in a liquid, said liquid being contacted within said longitudinal reaction zone with a second reactant at least partially embodied in a gas, the second reactant having a mass transfer rate into the liquid sufficient to allow a reaction rate that is essentially independent of said mass transfer rate.

11. The method of claim 10, wherein said each combination of reactants includes a catalyst system comprising a Group VIII B metal.

12. The method of claim 11, wherein the Group VIII B metal is palladium.

13. The method of claim 11, wherein the catalyst system further comprises a halide composition.

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14. The method of claim 11, wherein the catalyst system further comprises an inorganic co-catalyst.

15. The method of claim 14, wherein the catalyst system further comprises a combination of inorganic co-catalysts.

16. A combinatorial chemical synthesis system, comprising a vessel having a charge port adapted to sequentially receive a plurality of discrete combinations of reactants; a reaction chamber in communication with said charge port and adapted to receive and enclose the plurality of discrete combinations of reactants disposed linearly within said chamber; and a discharge port in communication with said reaction chamber to sequentially discharge reaction products of said combinations from said reaction chamber.

17. The system of claim 16, wherein said reaction chamber is sized to receive a plurality of vials sequentially charged through said charge port and into said chamber.

18. The system of claim 16, wherein said charge port and said discharge port each comprises an air lock.

19. The system of claim 16, wherein said charge port and said discharge port each comprises an air lock controlled by a ball valve.

20. The system of claim 16, wherein said chamber is a vertically longitudinal reaction zone adapted to receive each of said combinations of reactants in a vial by sequential gravity loading from the charge port.

21. The system of claim 16, further comprising a detector proximate said discharge port to detect said sequentially discharged reaction product from said reaction chamber.

22. The system of claim 16, further comprising a controller in communication with said reaction vessel to control varying reaction parameters within said chamber.

23. The system of claim 16, further comprising a controller in communication with said reaction vessel to control a sequence of charging said combinations of reactants to said chamber or a sequence of discharging said products from said chamber.

24. The system of claim 16, further comprising a detector in communication with said discharge port to detect said sequentially discharged reaction products and a processor in communication with said controller and said detector to correlate reaction or reactant variables with a corresponding reaction product.

25. A combinatorial chemical synthesis system, comprising a vessel having a charge port comprising an air lock controlled by a ball valve and adapted to sequentially receive a plurality of discrete combinations of reactants; a reaction chamber in communication with said charge port and adapted to receive and enclose the plurality of discrete combinations of reactants disposed linearly within said chamber; a discharge port comprising an air lock controlled by a ball valve to sequentially discharge reaction products of said combinations from said reaction chamber; and a controller in communication with said reaction vessel to control varying reaction parameters within said chamber.